

ABSTRACT

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2 A power control system for a turbogenerator which provides electrical power to one
3 or more pump-jack oil wells. When the induction motor of a pump-jack oil well is powered
4 by three-phase utility power, the speed of the pump-jack shaft varies only slightly over the
5 pumping cycle but the utility power requirements can vary by four times the average pumping
6 power. This power variation makes it impractical to power a pump-jack oil well with a stand-
7 alone turbogenerator controlled by a conventional power control system. This power control
8 system comprises a turbogenerator inverter, a load inverter, and a central processing unit
9 which controls the frequency and voltage/current of each inverter. Throughout the oil well's
10 pumping cycle, the central processing unit increases or decreases the frequency of the load
11 inverter in order to axially accelerate and decelerate the masses of the down hole steel pump
12 rods and oil, and to rotationally accelerate and decelerate the masses of the motor rotors and
13 counter balance weights. This allows kinetic energy to be alternately stored in and extracted
14 from the moving masses of the oil well and allows the oil pumping power to be precisely
15 controlled. Historical data on the load inverter's frequency versus time profile throughout
16 previous pumping cycles, which resulted in nearly constant turbogenerator power
17 requirements, is utilized to further reduce variations in power.